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ABSTRACT

This survey of engineering freshmen is the fourth of a series of five surveys seeking to determine the characteristics and attitudes of engineering students and the changes in these areas which occur as the students proceed through their first two years in engineering. Thirteen of the original sixteen schools included in the spring 1977 freshman survey are included in this survey. The survey questionnaire consisted of 60 items and was returned by 64% of those students eligible for the survey. Data are presented for all survey items including: reason for career choice, problems, grades, reaction to academic situations, reaction to instructors, reaction to friends, future plans, marriage preferences, and motivation towards becoming an engineer. (SL)

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RESULTS OF SPRING 1977 SURVEY OF ENGINEERING FRESHMEN

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Introduction

The spring 1977 survey of engineering freshmen is the fourth of a series of five surveys seeking to determine the characteristics and attitudes of male and female engineering students, and the changes in these areas as students proceed through their first two years in engineering. The results of the three previous surveys have been presented in "Results of Fall 1975 Survey of Engineering Freshmen (Revised)," "Results of Spring 1976 Survey of Engineering Freshmen," and "Results of Fall 1976 Survey of Engineering Freshmen."

Survey Population and Sample

The survey results refer to the population of all first-time engineering freshmen who entered one of forty-two schools during the fall 1976 term and continued in engineering at the same school during the spring 1977 term. We estimate that there were 19,400 students in this population, including 16,330 men and 3,070 women.

Although sixteen schools were originally included in the survey program, only thirteen schools' survey results were included in the spring 1977 freshman survey. These included all but one of the fourteen schools which participated in the fall 1976 survey. Unfortunately, the survey responses from Howard University were apparently lost in the mail. In all, six schools selected with certainty and seven randomly selected schools contributed to the spring 1977 freshman survey.

In order to adjust for the non-participation of three schools, the responses of students in the other schools were subjected to additional weighting procedures. For the six certainty schools, men's weights were multiplied by a factor of 1.22, and women's by a factor of 1.20. These weight factors were based on the size of the male and female freshman engineering enrollments at Texas A&M University for fall 1975 and at Howard University for fall 1976, relative to the enrollments of the other six certainty schools for fall 1976. For the seven randomly selected schools, men's weights were multiplied by a factor of 1.07, and women's by a factor of 1.11. These weight factors were based on the size of the male and female freshman engineering enrollments at Vanderbilt

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University for fall 1975 relative to the enrollments of the other seven randomly selected schools for fall 1976.

The Questionnaire

The questionnaire administered to freshmen in the spring of 1977 consisted of 60 items designed by the research team. Except for items 37 and 38, the questions were nearly identical to those on the spring 1976 freshman survey. A number of the questionnaire items were adapted from Part I of the College Student Questionnaires, with the permission of the Educational Testing Service. The questionnaire generally took less than 30 minutes to complete.

Response Rates

Questionnaires were administered during the second half of spring term at the thirteen schools. Two different response rates have been calculated: (1) the overall response rate for the 13 participating schools and (2) the percentages of fall respondents at the 13 schools who completed the spring survey.

The number of students in the original sample at the 13 institutions who continued in engineering in the spring of 1977 was 2,542, including 1,467 men and 1,075 women. Five hundred eighty men and 535 women completed the survey. Thus the overall response rates for the 13 schools in the spring 1977 freshman survey were 39.5% for the men and 49.8% for the women.

However, only those students who had completed the fall 1976 survey were eligible for the spring survey. At the thirteen schools, 956 men and 793 women who had taken the fall survey remained in engineering in the spring. Thus 580/956 men (60.7%) and 535/793 women (67.5%) of those eligible at the thirteen schools completed the spring 1977 freshman survey.

The presence of both school and student nonresponse creates some nonresponse bias of unknown magnitude. Nonresponse adjustment procedures are included in the analysis of the survey data in an attempt to minimize this nonresponse bias.

Analysis

Data were analyzed in terms of the proportions of men and of women in the population who would have a given response to a question. In order to make valid estimates of the population proportions, the data were subjected to statistical weighting procedures. Each respondent was assigned a weight having three components. The first component adjusts the sample to represent all students in the population. The second component is an adjustment for student nonresponse. The third component adjusts for the non-participation of Texas A&M University and Howard University, and of Vanderbilt University.

The precision of the estimated proportions was gauged by obtaining estimates of the standard errors of these estimated proportions. The standard error of an estimated proportion is a measure of the variability that the estimated proportion would have in repeated samples of the same type from this population. Typical standard errors of estimated proportions for this survey range from .001 to .060. We also estimated the precision of the difference between the estimated proportions for men and for women. Typical estimated standard errors of differences in estimated proportions between men and women range from .003 to .061. By comparing the difference in the estimated proportions of men and women giving a certain response with the estimated standard error of the difference, we determined whether the differences in estimated proportions were statistically significant.

Results

Each survey question was tested for the statistical significance of the difference in the estimated proportions of men and women giving a particular response or responses to the question. We used two levels of statistical significance, the .05 level and the .01 level. A difference that was significant at the .05 level means that there was only about one chance in twenty that the magnitude of the observed difference in estimated porportions would be found if the population proportions were equal. Significance at the .01 level means that there was only about one chance in a hundred that the magnitude of the observed difference in estimated proportions would be found if the population proportions were equal.

Survey results are given in the following table. Responses in brackets were considered as one response in the statistical analysis.

Estimated Proportions of Students
Responding to Each Alternative in the
Spring 1977 Freshman Survey+

Item and Response Description	Total	Men	Women	Significance of Difference
1. Engineering major field				
1. General	1.6	1.8	0.5	
2. Aeronautical and astronautical	2.1	2.0	2.7	
3. Chemical	15.7	15.8	15.2	
4. Civil	13.0	13.5	10.1	
5. Electrical	20.3	22.3	9.3	**
6. Industrial	4.0	4.0	4.0	
7. Mechanical	15.8	16.1	13.9	
8. Mineral, petroleum and geological	6.2	6.8	3.1	**
No response	21.3	17.6	41.2	
2. Engineering major field (continued)				
1. Agricultural	0.5	0.3	1.6	
2. Architectural	0.9	1.0	0.8	
3. Bioengineering	0.8	0.5	2.8	**
4. Ceramics	0.4	0.5	0.3	
5. Computer science	2.9	2.0	7.5	
6. Engineering physics	0.8	0.7	1.0	
7. Metallurgical	2.2	1.9	3.6	**
8. Nuclear	3.1	3.3	1.8	**
9. Other engineering	2.5	2.3	3.7	
10. Undecided, but in engineering	4.8	4.2	7.9	*
No response	81.0	83.3	69.0	
3. Non-engineering major field				
1. Biological science	1.4	1.4	1.5	
2. Physical science	0.8	0.9	0.5	
3. Mathematics	0.5	0.3	1.5	
4. Social science, humanities, arts	0.3	0.1	1.6	
5. Education	0.5	0.2	1.9	
6. Business	1.0	0.9	1.6	
7. Agriculture	0.3	0.3	0.4	
8. Architecture or city planning	0.4	0.3	0.6	
9. Other non-engineering	0.4	0.3	1.1	
10. Undecided, not engineering	0.9	0.7	2.0	
No response	93.4	94.5	87.4	**

+Some survey questions were adapted from College Student Questionnaire-Part I, with the permission of the Educational Testing Service.
*indicates significant difference at the 5% level
**indicates significant difference at the 1% level

Item and response description	Total	Men	Women	Significance of Difference
4. Most important reason for career choice				
1. Job openings available	18.5	18.3	19.9	**
2. Rapid career advancement	2.1	2.3	0.6	**
3. High anticipated earnings	7.8	8.9	2.4	**
4. Contribution to society	3.5	3.6	3.1	
5. Work with ideas	6.9	6.8	7.2	
6. Prestige of the profession	0.8	1.0	0.2	
7. Work with people	1.1	0.7	3.0	**
8. Work itself is interesting	53.8	53.1	57.7	*
9. Opportunity to combine career and family	1.6	1.7	1.1	
10. Other	3.5	3.3	4.7	
No response	0.3	0.3	0.1	
5. Second reason for career choice				
1. Job openings available	28.5	28.3	29.3	
2. Rapid career advancement	5.1	5.5	2.9	*
3. High anticipated earnings	17.7	18.6	12.9	*
4. Contribution to society	9.5	9.3	10.7	
5. Work with ideas	11.4	11.9	9.1	
6. Prestige of the profession	3.4	3.7	1.9	
7. Work with people	3.3	1.9	10.8	*
8. Work itself is interesting	16.5	16.3	17.7	
9. Opportunity to combine career and family	2.9	3.0	2.4	
10. Other	1.4	1.3	2.3	
No response	0.2	0.2	0.1	
6. Third reason for career choice				
1. Job openings available	15.0	15.4	13.0	
2. Rapid career advancement	8.3	8.6	6.7	
3. High anticipated earnings	27.2	27.3	26.4	
4. Contribution to society	8.9	8.3	11.9	*
5. Work with ideas	9.6	9.7	9.1	
6. Prestige of the profession	8.8	9.1	7.4	
7. Work with people	5.3	5.1	5.9	
8. Work itself is interesting	7.8	7.6	9.0	
9. Opportunity to combine career and family	3.2	2.7	5.8	**
10. Other	5.1	5.2	4.8	
No response	0.9	1.1	0.0	
7. Preferred professional work situation				
1. Own business	14.6	16.5	4.4	**
2. Small business firm	8.4	8.8	6.2	*
3. Medium-large firm or corporation	42.3	42.1	43.2	
4. Own professional office	7.0	7.2	6.0	
5. Educational institution	1.9	1.7	3.5	**
6. Public or private research organization	12.0	10.7	18.6	*
7. Public or private welfare agency	0.8	0.8	0.9	
8. Government service	1.7	1.5	2.6	
9. Other firm, organization or situation	2.3	2.2	2.7	
10. I don't know	8.8	8.2	11.8	
No response	0.4	0.4	0.1	

Item and response description	Total	Men	Women	Significance of Difference
8. Expected professional work situation				
1. Own business	3.2	3.6	0.9	*
2. Small business firm	4.6	4.8	3.3	
3. Medium-large firm or corporation	66.7	66.9	65.8	
4. Own professional office	1.7	1.8	0.9	*
5. Educational institution	0.8	0.8	0.8	
6. Public or private research organization	3.6	3.2	5.8	
7. Public or private welfare agency	0.2	0.0	1.5	
8. Government service	3.3	3.4	2.5	
9. Other firm, organization or situation	2.9	2.8	3.1	
10. I don't know	12.5	12.1	14.8	
No response	0.5	0.5	0.7	
9. Highest degree planned				
1. No degree	0.0	0.0	0.2	
2. Bachelor's degree	39.2	38.7	41.7	
3. Master's degree, not in business	30.7	30.2	33.3	
4. M.B.A.	12.4	12.9	9.3	**
5. Ph.D. or Ed.D.	12.0	12.5	9.1	
6. Law degree	1.8	1.8	1.9	
7. Medical degree	2.2	2.0	3.3	
8. Dental degree	0.3	0.3	0.0	
9. Other degree	0.6	0.6	0.5	
No response	0.8	0.8	0.7	
10. Greatest source of personal satisfaction in freshman year				
1. Coursework in general	15.3	16.3	10.1	**
2. Coursework in major	10.9	11.6	7.2	**
3. Individual study	2.6	2.4	3.8	
4. Organized extracurricular activities	6.3	6.3	6.3	
5. "Bull session" with students	5.1	5.8	1.3	**
6. Social life, dating, parties	5.0	4.6	6.8	
7. Close friendships with students	14.7	14.7	15.0	
8. Wide variety of acquaintances	9.3	8.1	15.4	
9. Self-discovery, self-insight	23.0	22.0	28.0	
10. Other	7.2	7.4	5.8	
No response	0.7	0.8	0.3	
11. Second greatest source of personal satisfaction				
1. Coursework in general	12.7	11.8	17.4	**
2. Coursework in major	7.3	7.4	7.1	
3. Individual study	3.1	3.3	2.1	
4. Organized extracurricular activities	8.5	8.7	7.5	
5. "Bull session" with students	7.8	8.1	6.7	
6. Social life, dating, parties	9.9	10.0	9.1	
7. Close friendships with students	15.7	15.0	19.0	*
8. Wide variety of acquaintances	14.1	14.1	13.8	
9. Self-discovery, self-insight	14.3	14.4	13.3	
10. Other	5.4	5.8	3.5	
No response	1.2	1.4	0.5	

Item and response description	Total	Men	Women	Significance of Difference
12. Biggest problem during freshman year				
1. No major problems	14.8	14.9	14.6	
2. Finances	6.8	6.4	8.7	
3. Medical problems	1.5	1.3	2.7	
4. Handling course content	33.7	32.6	39.4	
5. Meeting or relationships with members of opposite sex	8.3	8.7	6.2	*
6. Deciding on major	8.1	8.2	7.8	
7. Family relations	3.4	3.6	2.2	
8. Discriminatory practices	0.1	0.1	0.2	
9. "Finding" oneself	16.1	16.6	13.4	
10. Other	6.6	7.0	4.6	
No response	0.5	0.6	0.2	
13. Second problem during freshman year				
1. No major problems	16.3	16.3	16.6	
2. Finances	10.6	10.9	9.1	
3. Medical problems	1.8	1.7	2.5	
4. Handling course content	14.6	14.6	14.6	
5. Meeting or relationships with members of opposite sex	14.5	15.7	8.0	**
6. Deciding on major	10.9	9.8	16.7	**
7. Family relations	2.5	2.4	3.5	
8. Discriminatory practices	0.8	0.8	0.7	
9. "Finding" oneself	14.3	13.8	17.0	
10. Other	7.9	8.5	4.8	*
No response	5.7	5.6	6.4	
14. Extent of participation in preprofessional organizations				
1. Not at all	75.0	78.2	58.0	**
2. To a small extent	21.9	19.2	36.3	**
3. Fairly extensively	2.3	1.9	4.5	
4. Very extensively	0.5	0.5	0.5	
No response	0.3	0.2	0.7	
15. Non-required reading				
1. Nonfiction in science, math, engineering	7.3	8.5	1.3	**
2. Science fiction	15.4	16.1	12.1	*
3. Mysteries, adventure fiction	3.2	2.9	4.8	**
4. Social sciences	9.0	9.2	7.8	
5. Psychology	1.6	1.7	1.1	
6. Novels, short stories, drama, poetry, etc.	17.3	12.8	41.0	**
7. Biographies and autobiographies	0.7	0.5	1.4	
8. Nonfiction-sports, leisure, etc.	20.9	23.8	5.8	**
9. Other	9.4	9.7	7.7	
10. Little or none	15.1	14.8	17.0	
No response	0.0	0.0	0.0	

Item and response description	Total	Men	Women	Significance of Difference
16. Relative amount of study as freshman				
1. Much less than most classmates	8.7	9.4	5.0	
2. Slightly less than most others	23.1	23.2	22.6	
3. Same as most others	36.2	34.7	43.9	**
4. Slightly more than most others	23.6	24.1	20.5	
5. Much more than most others	8.1	8.2	7.3	
No response	0.5	0.4	0.8	
17. Approximate first term grade average				
1. D+ or lower	3.2	3.0	4.1	
2. C-	5.1	5.3	4.0	
3. C	9.8	9.6	10.5	*
4. C+	15.2	15.7	12.6	
5. B-	11.4	11.1	13.3	
6. B	16.3	16.3	16.3	*
7. B+	16.3	16.3	16.4	
8. A-	11.7	11.8	11.3	
9. A or A+	10.5	10.4	11.0	
No response	0.5	0.5	0.5	
18. Importance of good grades				
1. Not important	2.4	2.4	2.4	
2. Somewhat important	23.8	24.4	20.7	
3. Quite important	49.1	47.6	57.1	*
4. Extremely important	24.6	25.6	19.6	**
No response	0.0	0.0	0.2	
19. Academic performance in comparison with others of own sex				
1. Better than most	34.4	35.9	26.3	**
2. Equal performance	50.3	49.5	54.8	
3. Worse than most others	14.5	13.9	17.8	
No response	0.7	0.7	1.1	
20. Academic performance in comparison with those of opposite sex in engineering				
1. Better than most	36.6	39.0	23.6	**
2. Equal performance	45.2	44.1	51.0	
3. Worse than most others	16.1	14.7	23.8	**
No response	2.1	2.2	1.6	
21. Most confident academic situation				
1. Group of same sex	4.2	4.0	5.4	
2. Group of opposite sex	4.0	3.7	5.3	
3. Equally mixed group	11.8	12.3	9.3	
4. Sex ratio makes no difference	78.4	78.3	79.3	
No response	1.5	1.7	0.7	

Item and response description	Total	Men	Women	Significance of Difference
22. Amount of competitiveness for grades				
1. A great deal	37.1	37.3	36.3	
2. A fair amount	45.2	45.5	43.5	
3. Only a little	15.2	14.8	17.2	
4. None	2.4	2.4	2.8	
No response	0.1	0.1	0.2	
23. Anxiety during course exams				
1. Very anxious	38.2	36.5	46.9	*
2. Somewhat anxious	48.7	49.3	45.6	
3. Not anxious	12.5	13.6	7.1	**
No response	0.5	0.6	0.4	
24. Greatest influence during freshman year				
1. Male faculty/staff member	10.1	10.8	6.3	**
2. Female faculty/staff member	1.3	1.2	1.6	
3. Male engineering students	21.3	22.3	15.8	
4. Female engineering students	2.3	0.9	9.8	**
5. Other male friends on campus	24.9	26.5	16.6	**
6. Other female friends on campus	6.6	3.8	21.4	**
7. Male friends from home town	3.1	3.2	2.9	
8. Female friends from home town	3.3	3.9	0.2	**
9. Family member(s)	11.6	11.8	10.8	
10. Other	12.4	12.6	11.6	
No response	3.0	3.0	3.0	
25. Consults with parents on important personal decisions				
1. Almost always	21.8	21.9	21.1	
2. Usually	33.2	32.7	35.8	
3. Occasionally	25.1	24.7	27.5	
4. Rarely	19.6	20.3	15.5	*
No response	0.2	0.3	0.1	
26. Degree of dependence on parents				
1. Quite dependent	13.8	14.7	8.9	**
2. Somewhat dependent	32.6	32.4	33.6	
3. Fairly independent	39.7	39.0	44.0	*
4. Very independent	13.5	13.6	13.2	
No response	0.4	0.4	0.3	
27. Personal relationship with instructors				
1. None	82.2	82.6	80.0	
2. One male instructor	9.5	9.0	12.2	
3. One female instructor	1.4	1.5	1.1	
4. One male and one female instructor	2.1	2.4	0.3	**
5. Two male instructors	2.5	2.3	3.6	
6. Two female instructors	0.3	0.3	0.2	
7. More than two instructors	1.8	1.8	1.8	
No response	0.2	0.1	0.9	

Item and response description	Total	Men	Women	Significance of Difference
28. Satisfaction with opportunity to individually discuss work with instructors				
1. Extremely dissatisfied	5.8	6.3	3.4	
2. Dissatisfied	22.4	22.4	22.6	
3. Satisfied	62.4	62.3	62.5	
4. Extremely satisfied	7.2	6.6	10.5	
No response	2.2	2.5	0.9	
29. Consults with close friends on important decisions				
1. Almost always	16.4	15.2	22.7	**
2. Usually	40.4	39.2	46.4	**
3. Seldom	31.4	32.8	24.0	**
4. Almost never	11.4	12.3	6.8	**
No response	0.4	0.5	0.0	
30. Feelings about sex ratio in engineering at ones college				
1. Too high a proportion of men	57.8	64.0	25.1	**
2. The proportions are fine	37.6	31.8	68.5	**
3. Too high a proportion of women	2.0	1.9	2.6	
No response	2.6	2.4	3.8	
31. Knows other engineering students in living unit				
1. Yes	90.8	90.8	91.2	
2. No	1.7	1.7	2.0	
3. Inapplicable to living situation	7.2	7.3	6.5	
No response	0.3	0.3	0.3	
32. Number of engineering students among three closest female friends				
1. None	51.2	53.4	39.2	**
2. One	27.1	26.5	30.0	*
3. Two	13.3	12.3	18.7	**
4. Three	6.6	5.7	11.7	**
No response	1.8	2.1	0.4	
33. Number of engineering students among three closest male friends				
1. None	17.2	17.2	17.4	
2. One	25.0	25.1	24.3	
3. Two	28.2	27.8	30.6	
4. Three	28.9	29.4	25.8	**
No response	0.7	0.5	1.9	

Item and response description	Total	Men	Women	Significance of Difference
34. Estimate of proportion of men among practicing engineers in U.S.				
1. 95% or more	16.0	15.6	18.1	
2. 90-94%	30.8	30.2	34.0	
3. 85-89%	24.9	25.5	21.8	
4. 80-84%	11.6	12.0	9.5	
5. Less than 80%	3.9	4.0	3.2	
6. No idea	12.4	12.4	12.6	
No response	0.3	0.2	0.8	
35. Knew a married woman who was successful in personal and working life				
1. Yes	78.2	77.9	79.8	
2. No	20.1	20.2	19.6	
No response	1.7	1.9	0.6	
36. Knew a single woman who was successful in personal and working life				
1. Yes	69.3	69.7	66.7	
2. No	28.8	28.4	31.2	
No response	1.9	1.9	2.1	
37. Acquainted with a male engineer since entering college				
1. Yes	68.8	68.5	70.5	
2. No	30.5	31.0	27.7	
No response	0.7	0.5	1.8	
38. Acquainted with a female engineer since entering college				
1. Yes	33.1	30.2	48.7	**
2. No	65.8	68.9	49.4	**
No response	1.1	1.0	1.8	
39. Plans for Fall 1977 school term				
1. Return in engineering	86.8	87.4	83.7	*
2. Return in science or math	2.7	2.2	5.0	*
3. Return in other field	1.3	0.6	5.0	**
4. Study engineering elsewhere	2.0	2.2	0.7	*
5. Study science or math elsewhere	0.2	0.2	0.6	
6. Study other field elsewhere	0.3	0.3	0.6	
7. Work in co-op program	2.2	2.3	1.8	
8. Leave school completely	0.3	0.4	0.1	
9. Other	0.8	0.9	0.1	
10. Unknown	2.9	3.0	2.4	
No response	0.4	0.5	0.0	

Item and response description	Total	Men	Women	Significance of Difference
40. Indicate major reason for leaving engineering				
1. Academic difficulty	3.6	3.6	3.9	
2. Financial reasons	1.2	1.4	0.1	
3. Image of the profession	0.4	0.3	1.1	
4. Interest in another field	3.1	2.9	3.9	
5. Lack of interest in engineering	2.6	2.5	3.4	
6. Personal reasons	0.7	0.6	1.5	
7. Engineering courses unappealing	0.8	0.7	1.6	
8. Other	0.9	0.9	0.6	
No response	86.7	87.2	83.9	
41. Age preference for marriage				
No response	1.0	1.0	1.0	
1. Inapplicable, or I don't know	15.5	16.3	10.8	**
2. Never	1.9	1.9	2.1	
3. 20 years old or younger	2.5	2.6	1.3	
4. 21 to 23	21.9	21.4	24.7	
5. 24 to 26	39.6	39.2	41.9	
6. 27 to 29	14.0	14.0	14.0	
7. 30 to 32	2.4	2.3	3.1	
8. 33 to 35	0.5	0.6	0.1	
9. 36 to 38	0.1	0.1	0.0	
10. 39 years old or older	0.6	0.6	0.5	
42. Age preference for completing school				
No response	0.6	0.6	0.4	
1. Inapplicable, or I don't know	3.2	3.3	2.8	
2. Never	0.7	0.7	0.7	
3. 20 years old or younger	1.3	1.4	0.6	
4. 21 to 23	72.4	70.6	82.3	**
5. 24 to 26	18.4	19.7	11.2	**
6. 27 to 29	2.4	2.6	0.9	
7. 30 to 32	0.6	0.7	0.3	
8. 33 to 35	0.3	0.3	0.6	
9. 36 to 38	0.0	0.0	0.0	
10. 39 years old or older	0.2	0.1	0.3	
43. Age preference for having first child				
No response	1.5	1.7	0.6	
1. Inapplicable, or I don't know	24.1	24.6	21.5	
2. Never	5.0	3.6	12.5	**
3. 20 years old or younger	0.7	0.8	0.3	
4. 21 to 23	1.7	1.5	2.3	
5. 24 to 26	20.9	21.4	18.5	
6. 27 to 29	31.9	31.6	33.3	
7. 30 to 32	10.7	10.8	9.9	
8. 33 to 35	2.0	2.2	0.9	
9. 36 to 38	0.7	0.8	0.3	
10. 39 years old or older	0.9	1.0	0.1	

Item and response description	Total	Men	Women	Significance of Difference
44. Age preference for having last child				
No response	3.2	3.6	1.1	
1. Inapplicable, or I don't know	30.7	31.2	28.3	
2. Never	3.9	2.9	9.0	**
3. 20 years old or younger	0.1	0.1	0.0	
4. 21 to 23	0.0	0.0	0.2	
5. 24 to 26	1.7	1.6	2.6	
6. 27 to 29	10.7	11.0	9.2	
7. 30 to 32	20.2	18.5	29.5	**
8. 33 to 35	17.2	17.7	15.0	
9. 36 to 38	8.6	9.5	4.2	**
10. 39 years old or older	3.5	4.0	0.8	*
45. Age to first start full-time professional work				
No response	0.6	0.6	0.2	
1. Inapplicable, or I don't know	4.6	4.8	3.2	
2. Never	0.9	0.9	1.1	
3. 20 years old or younger	1.1	1.1	0.6	
4. 21 to 23	50.1	47.8	62.2	**
5. 24 to 26	34.6	35.7	28.9	*
6. 27 to 29	6.0	6.7	2.2	**
7. 30 to 32	2.0	2.1	1.4	
8. 33 to 35	0.3	0.3	0.0	
9. 36 to 38	0.0	0.0	0.0	
10. 39 years old or older	0.0	0.0	0.0	
46. Age to first start part-time professional work				
No response	6.2	7.1	1.5	
1. Inapplicable, or I don't know	23.2	22.0	29.2	
2. Never	10.4	10.6	9.3	
3. 20 years old or younger	31.3	32.2	26.3	**
4. 21 to 23	16.5	18.1	7.9	**
5. 24 to 26	5.5	5.4	5.9	
6. 27 to 29	1.8	1.1	5.7	
7. 30 to 32	0.9	0.3	3.6	**
8. 33 to 35	0.7	0.1	3.8	**
9. 36 to 38	0.4	0.0	2.6	**
10. 39 years old or older	3.1	2.9	4.1	
47. Age to first stop working for over six months				
No response	7.1	8.1	1.6	
1. Inapplicable, or I don't know	35.7	35.4	37.2	
2. Never	10.5	10.1	12.8	
3. 20 years old or younger	1.6	1.8	0.5	
4. 21 to 23	1.8	2.1	0.5	
5. 24 to 26	3.9	3.1	8.2	**
6. 27 to 29	3.9	1.5	16.8	**
7. 30 to 32	2.9	2.0	7.6	**
8. 33 to 35	1.6	1.6	1.6	
9. 36 to 38	1.3	1.3	1.3	
10. 39 years old or older	29.6	33.0	11.8	**

Item and response description	Total	Men	Women	Significance of Difference
48. Age to return to full-time work				
No response	37.9	38.4	35.2	*
1. Inapplicable, or I don't know	27.1	28.1	21.5	
2. Never	5.0	5.4	2.6	*
3. 20 years old or younger	0.2	0.1	0.2	
4. 21 to 23	6.1	6.6	3.8	
5. 24 to 26	7.7	8.8	2.0	**
6. 27 to 29	2.7	2.7	2.9	
7. 30 to 32	1.7	1.2	4.8	**
8. 33 to 35	2.6	1.5	8.1	**
9. 36 to 38	2.0	0.9	7.6	**
10. 39 years old or older	7.0	6.2	11.3	*
49. Colleges described engineering education realistically				
1. Strongly agree	4.8	4.8	5.0	
2. Agree	40.2	39.5	44.1	
3. Neutral, no opinion	25.8	25.8	25.6	
4. Disagree	21.9	22.0	21.0	
5. Strongly disagree	6.5	7.0	3.4	
No response	0.8	0.8	0.8	
50. Understood nature of engineering career				
1. Strongly agree	7.0	7.0	6.9	**
2. Agree	36.9	38.5	28.7	
3. Neutral, no opinion	15.6	15.5	16.0	
4. Disagree	32.5	31.1	40.0	**
5. Strongly disagree	7.3	7.2	7.8	
No response	0.6	0.6	0.7	
51. Strongly motivated to be an engineer				
1. Strongly agree	21.4	20.8	24.2	
2. Agree	44.9	45.0	44.7	
3. Neutral, no opinion	20.7	21.8	14.9	*
4. Disagree	7.1	7.1	7.0	**
5. Strongly disagree	4.4	3.7	8.2	
No response	1.5	1.6	1.0	
52. Parents enthusiastic about student being in engineering				
1. Strongly agree	30.3	29.7	33.5	
2. Agree	47.0	47.2	45.7	
3. Neutral, no opinion	16.7	17.1	14.6	
4. Disagree	3.2	3.3	2.9	
5. Strongly disagree	1.2	1.1	2.0	
No response	1.6	1.6	1.3	
53. Some academic fields outside engineering strongly interest the student				
1. Strongly agree	31.4	30.8	34.6	
2. Agree	39.6	39.5	39.9	
3. Neutral, no opinion	16.9	17.0	16.2	
4. Disagree	9.5	10.0	7.1	
5. Strongly disagree	1.9	2.0	1.2	
No response	0.8	0.7	1.1	

Item and response description	Total	Men	Women	Significance of Difference
54. Grades are honest reflection of student's ability				
1. Strongly agree	9.9	10.0	9.7	
2. Agree	28.0	28.4	25.7	
3. Neutral, no opinion	14.5	14.4	14.9	
4. Disagree	32.9	32.1	37.0	
5. Strongly disagree	13.9	14.4	11.2	
No response	0.9	0.8	1.5	
55. Graduating as an engineer is worth the effort				
1. Strongly agree	27.7	26.5	34.3	
2. Agree	50.2	51.1	45.7	
3. Neutral, no opinion	15.8	16.4	12.6	
4. Disagree	3.0	2.8	4.1	
5. Strongly disagree	1.3	1.2	1.6	
No response	2.0	2.0	1.6	
56. Engineering faculty's advising and counseling is helpful				
1. Strongly agree	7.1	5.9	13.4	**
2. Agree	34.6	34.3	35.9	
3. Neutral, no opinion	37.1	38.3	31.0	*
4. Disagree	13.4	13.4	13.5	
5. Strongly disagree	6.3	6.6	4.7	
No response	1.5	1.4	1.5	
57. Expect a master's degree in engineering				
1. Strongly agree	11.2	11.3	10.3	
2. Agree	25.5	25.6	24.9	
3. Neutral, no opinion	28.2	28.5	26.7	
4. Disagree	22.2	22.4	21.1	
5. Strongly disagree	11.9	11.2	15.9	
No response	1.1	1.1	1.1	
58. More strongly motivated to be an engineer than a year ago				
1. Strongly agree	13.9	13.0	18.7	
2. Agree	39.5	39.8	37.7	
3. Neutral, no opinion	27.2	28.3	21.0	**
4. Disagree	12.1	12.4	10.2	**
5. Strongly disagree	6.5	5.5	11.7	
No response	0.9	1.0	0.8	
59. Engineering is a good field to be in to help solve social problems				
1. Strongly agree	10.2	10.3	9.8	
2. Agree	34.8	35.1	33.2	
3. Neutral, no opinion	37.4	36.8	40.4	
4. Disagree	10.4	10.1	12.1	
5. Strongly disagree	6.0	6.4	3.4	
No response	1.2	1.2	1.2	

Item and response description	Total	Men	Women	Significance of Difference
60. Shouldn't worry about harmful effects of technology because new inventions will solve the problems				
1. Strongly agree	2.4	2.7	0.7	**
2. Agree	5.0	5.5	2.3	
3. Neutral, no opinion	13.1	13.3	12.1	
4. Disagree	28.0	28.0	27.8	**
5. Strongly disagree	49.3	48.3	54.7	
No opinion	2.3	2.3	2.4	